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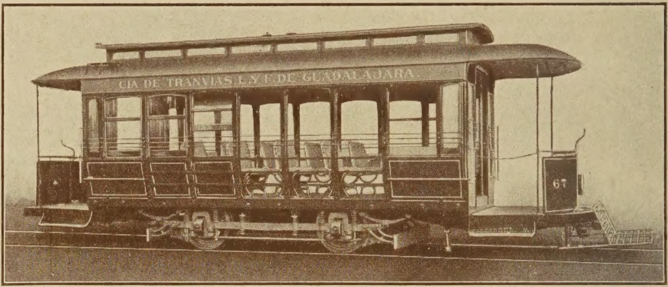
Vol. IV DECEMBER, 1910 No. 12

BRILL MAGAZINE

Bowbazar Street
Calcutta, India.



THE BRILL CONVERTIBLE CAR

Patented

Though used in eighty cities at home and abroad, this car is practically unknown to a considerable number of railway operators in cities where traffic conditions allow the use of open cars with running boards. There is no more popular car for summer service than the ordinary open car with accessible side entrances and the open car can be had combined with a genuine closed car, one that can be warmed with the ordinary number of heaters in winter, even in the northern states. It is quite possible that this car might prove the most economical for your service and the most satisfactory for your public. The running board is not an essential feature as you will see by the above illustration. Shall we send you complete information on this self-contained, durable and thoroughly practicable convertible car?

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

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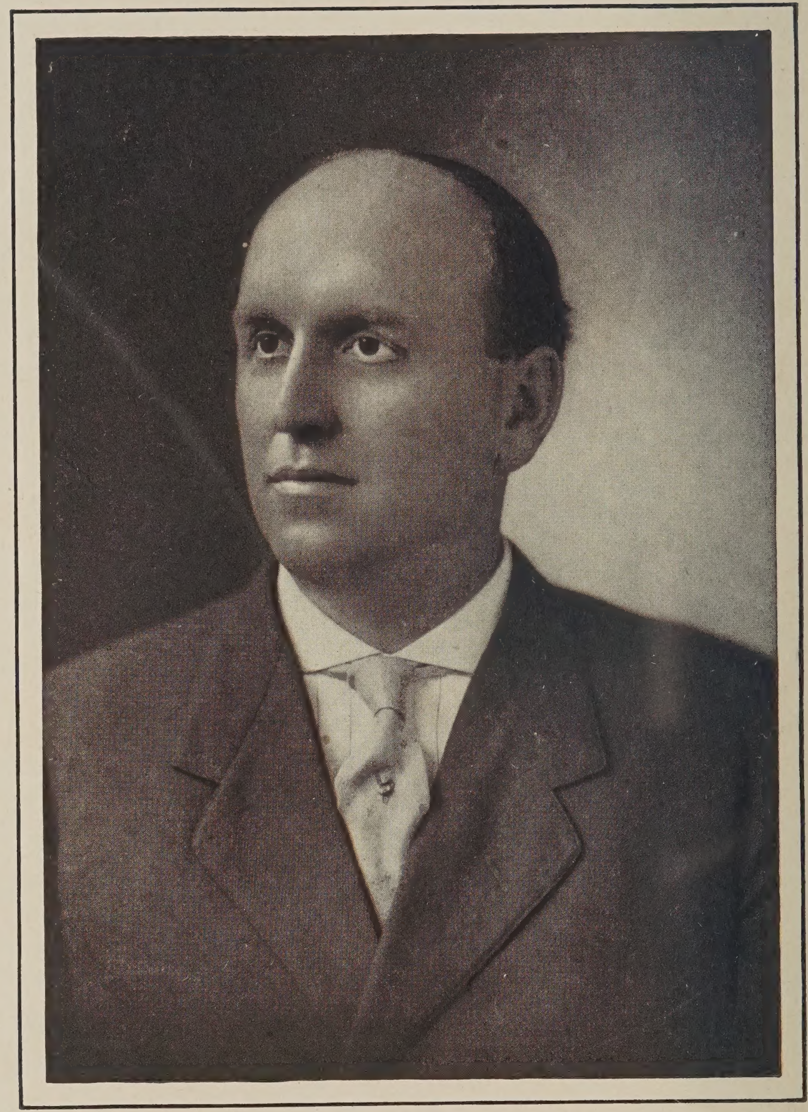


Stevens

BRILL
MAGA
ZINE

Supplement to Brill Magazine, December, 1910

BRILL MAGAZINE

Vol. IV DECEMBER, 1910 No. 12

R. P. STEVENS

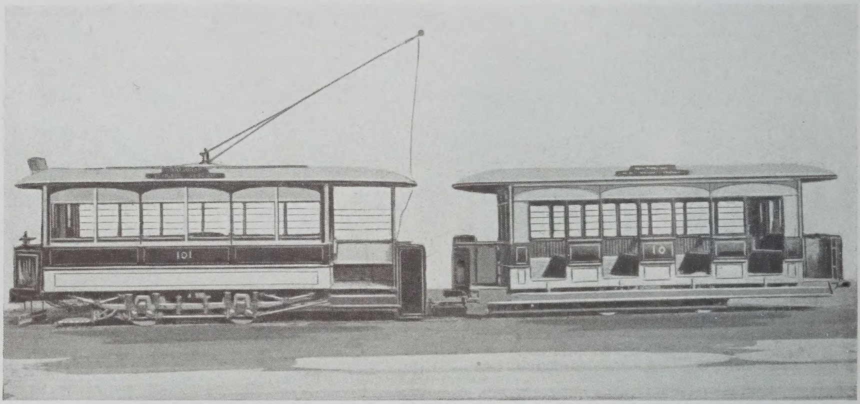
[WITH PORTRAIT INSERT]

RAY P. STEVENS, president and general manager of the Lehigh Valley Transit Company, was born April 3, 1877, in Eastport, Maine. He prepared for college at the Ellsworth, Maine, High School and the E. M. S. Seminary at Bucksport, Maine, and in 1898 graduated from the University of Maine with the degree of Bachelor of Electrical Engineering. During the period he was attending school and college he conducted a general electric and contracting business in Ellsworth, Maine, equipping many of the large summer hotels at Bar Harbor and vicinity. After finishing college he went to work first for the Bell Telephone Company and then for the General Electric Company at Lynn, Mass., at the same time living in Boston and taking post graduate work at the Massachusetts Institute of Technology. His first electric railway connection was in Everett, Washington, where he practically built an entirely new system, including power house, shops, etc. Before he had finished this he was persuaded to manage the railway and lighting properties in Everett and under his capable management the earnings doubled in less than five years. He next went to Auburn, New York, as general superintendent of the Auburn and Syracuse Electric Railway Company where he remained two years. During this short period he made so notable a showing that he was offered the presidency of the Lehigh Valley Transit Company which controls nearly 150 miles of electric railway as well as considerable lighting property throughout southeastern Pennsylvania. At that time the company was yearly showing a large deficit; now it is earning enough to pay a 4% dividend on preferred stock. Mr. Stevens, at the time of his election as president was undoubtedly the youngest railway president in this country. Since then he has twice been elected president of the Pennsylvania Street Railway Association.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

CALCUTTA, INDIA*

CALCUTTA, the metropolis and capital of India, is the greatest trade center of the Orient. It is situated on the eastern side of the Hooghly River, 80 miles from the Bay of Bengal, and has ample wharfage and anchorage for the immense fleets of vessels by which a vast commerce is carried on with all parts of the world. The city is the terminus of four great railway systems which extend to all parts of the Empire and is the distributing point of the large and varied commerce of the Ganges Valley, Central India, Assam, Burmah and the East Indian coast. Calcutta has a university and numerous colleges; prints 50 newspapers and is the center of Indian official life. Including certain adjoining suburbs and the municipality of Howrah, on the opposite side of the river, the population is about one and one-quarter millions. The European



Conditions Which Govern the Type of Car for City Service—All of the Closed and Open Motor Cars are Operated with Trailers—The Closed Cars Seat Four Passengers on the Rear Platform—All Motor Cars are Mounted on Brill No. 21-E Trucks population does not exceed 15,000 during the most favorable season of the year. The climate is semi-tropical with a range of temperature of about 20° Fahrenheit and an annual rainfall of 65 inches. From June to September severe wind storms frequently sweep over the city, sometimes with destructive effect. Occasionally, during the rainy season, the cars are stalled by floods in certain parts of the city. The ground is flat and is composed of an alluvial desposit only 20 feet above sea level. The city proper is divided into three parts: the European business district at the center and bordering the river; the native residential and business district in the northern part; and the European residential district in the southern part. In the native section the streets are mostly narrow and the houses and shops generally poor and crowded; the palaces of some of the native princes and rajahs stand side by side with the huts of the poorer classes. Within recent years a wide road has been cut through this section from the railway stations on the eastern side of the city to the floating bridge which forms the principal connection with Howrah. Other broad streets have been built and a comprehensive scheme for the improvement of both streets and houses throughout the district is being promoted by the government. Fifteen miles of new thoroughfares and a number of open places are proposed. The European section has wide well-paved roads and palatial residences.

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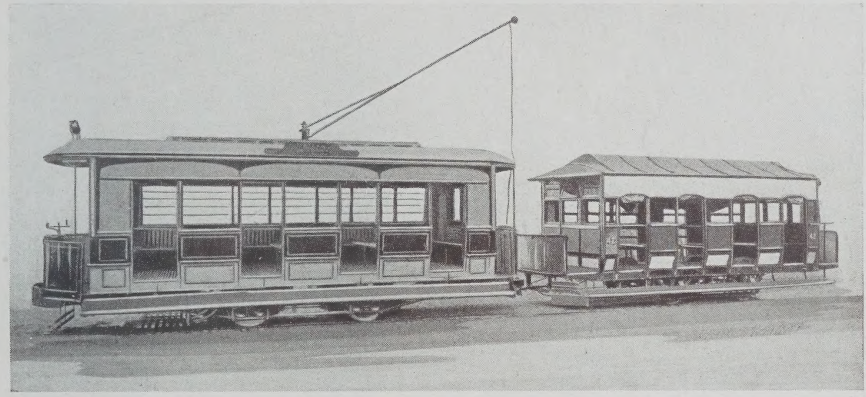
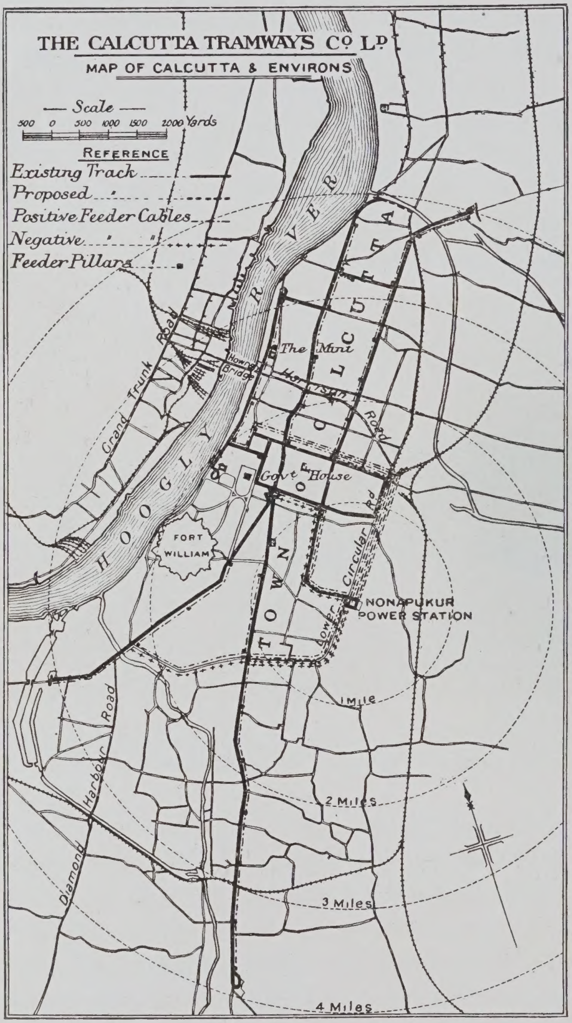
* This series of articles will be continued during the coming year. The present article is the twenty-fourth.

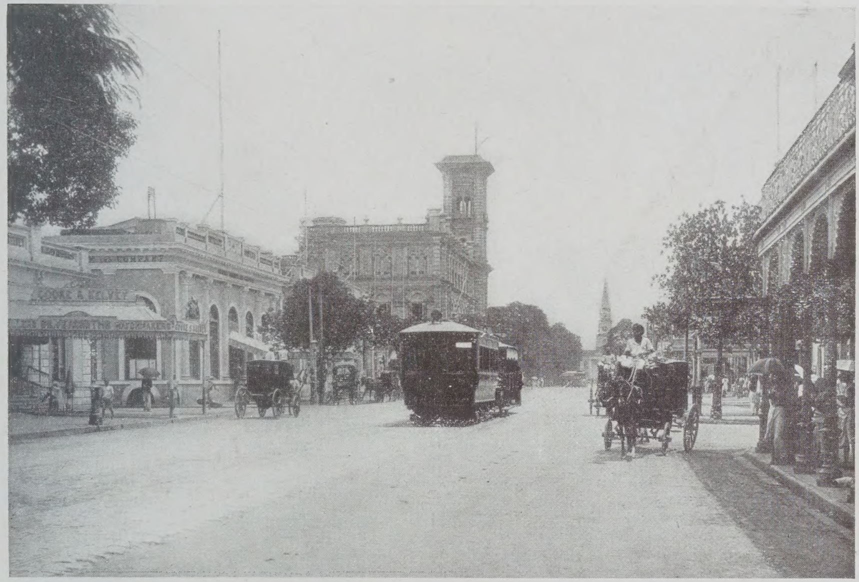


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Open Motor Cars Seat 40 Passengers—There are no Doors at the Entrances—Some of the Old Horse Cars are Used as Trailers—The Motor Cars are for First-class and the Trailer for Second-class Passengers



Reproduced from the Tramway and Railroad World

The tramway system is composed of eleven sections with most of the lines radiating from the central part of the city, which is the governmental and European business district. Three lines extend through the native portion of the city to the north and one line crosses these traversing the Harrison Road, the main artery which divides this district. Two lines run southward, one of them through a densely populated suburb and having on its route a famous Hindoo temple to which crowds are brought from all parts of the city throughout the year and during certain festivals the car service has to be doubled; the other line parallels the river and serves a populous suburb in the neighborhood of certain of the great docks. On this line the traffic is greatly augmented by the multitudes attending the race course in the large city park known as the Maidan. The principal income is derived from the business and professional classes and government employes. The laboring classes are too poor to use the cars regularly. The Europeans form too small a part of the population and use the cars too little to be counted as a factor in the earning power. Aside from the regular traffic, the Hindoo temples and Mahomedan mosques draw large crowds at all times, especially on certain days and occasions when thousands of devotees gather from all points of the city and surrounding districts for religious exercises.



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CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Old Court House Street—Cars of Two Sections of the Tramway System Traverse this Thoroughfare between the European Commercial and Residential Districts

The entire tramway system is operated by the Calcutta Tramways Company. The lines are double-tracked throughout and are being extended in different parts of the city and suburbs and it is proposed to continue the operations outside the municipal limits under a government subsidy to improve communication with suburban districts. With the exception of thirty radial trucks used on the Howrah division the motor cars are all mounted on Brill No. 21-E trucks. There are 171 motor cars of both open and closed types each of which is operated with an open trailer. The motor cars measure 20 ft. 6 in. over the end panels. The driver's platform on all motor cars is 2 ft. 6 in. long; the conductor's platform on open cars is 2 ft. 3 in. long; and on closed cars 5 ft. long. Width of cars over side posts is 7 ft. 6 in.; over all 8 ft. 4 in. The closed cars seat 27 passengers and the open car 40 passengers. The weight of a car body is approximately 10,000 lb. and the weight of a car complete with truck, motors and electrical equipment, brakes, etc., is about 20,000 lbs.

As will be seen in the illustrations, the cars have entrances on one side and in the open motor cars the opposite side is panelled the full length. The windows on the open side are furnished with curtains; this arrangement gives more protection from the severe climatic conditions than that of the ordinary open side in which one curtain extends from post to post and whenever raised exposes the passengers at the ends of both seats. The seats in all cars face forward as the cars are operated at one end only, loops being provided at the terminals. Plain arch roofs without headlinings, a plain finish and simplicity in

Conditions Which Govern the Type of Car for City Service—Esplanade Junction—Twelve Hundred Trains of Two Cars Each Arrive Here Daily details characterizes both open and closed cars. The framing and interior woodwork is entirely of teak which is proof against the ravages of insects and is little affected by alternating heat and moisture.

The cars are all run in trains of two, the motor car being for first-class and the trailer for second-class passengers, the service beginning at 5 A. M. and ending at 10.30 P. M. with considerable traffic in the early hours and the heaviest between 9.30 and 11 A. M. and 4.30 to 8 P. M. There are regular stopping places along the lines but, on account of the severe condition of heat and rain, passengers are allowed to enter and leave at any point. Motormen, conductors, checkers and inpectors are natives.

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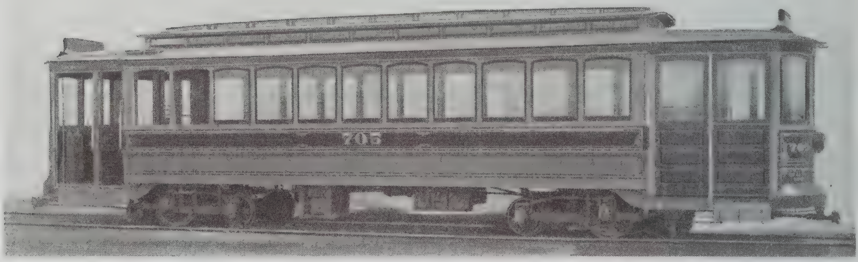
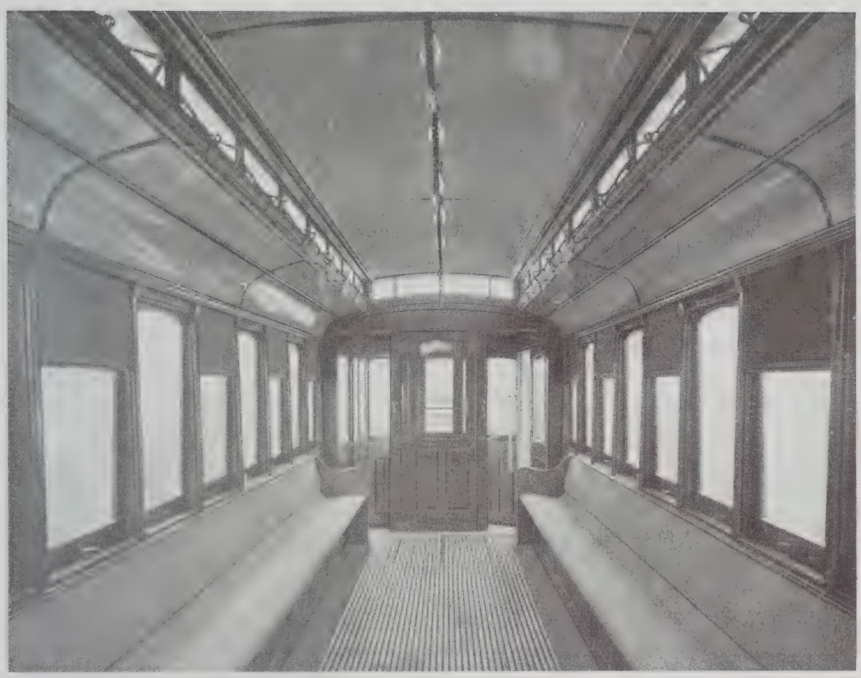
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Chowringhee Road—Around this Park, Chowringhee Place, are Government Buildings, Hotels and Residences of Europeans

MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON

THE American Car Company has just delivered a lot of 40 closed Pay-As-You-Enter cars to the Portland Railway, Light and Power Company and has 40 of the same type cars on order for delivery next year. This company is rapidly equipping its lines with prepayment cars, having received in the last three years nearly 150 Pay-As-You-Enter cars. In October, 1908, and also in December, 1909, numbers of BRILL MAGAZINE, descriptions are given of cars for Portland. The first article gives a description of the earliest prepayment cars, and trailer cars delivered the preceding year, while the second article deals with traction conditions in Portland. The last lot of cars delivered are of two lengths, 28 ft. 8 in. and 31 ft. 6 in., the illustrations showing the latter. With the exception of being somewhat longer and a few inches wider, the cars just delivered are practically indentical to those furnished during the past two years. The Portland Railway, Light and Power Company at present owns 241 miles of track and operates about 450 cars, controlling practically all the street railway properties and all the electric light and power plants in Portland as well as having large outside holdings. The Portland lines are practically divided into two divisions, the city lines proper and the suburban lines. The latter use a

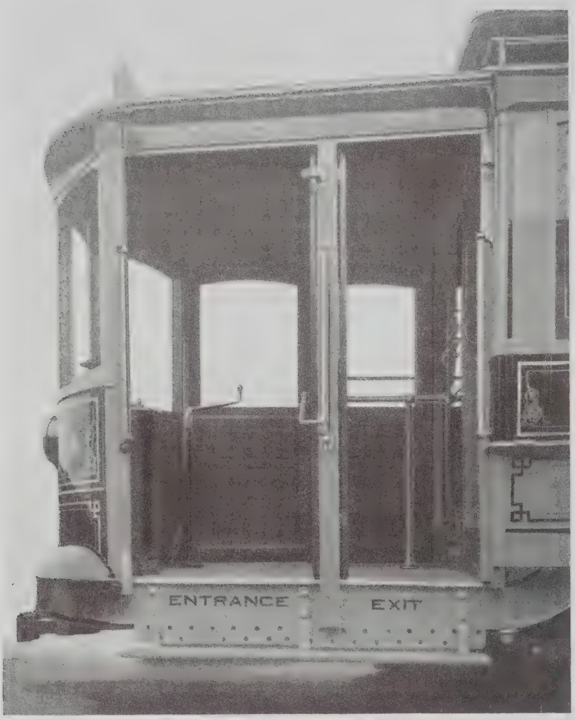


MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON—The Cars Are Mounted on Brill No. 22 Special Single-motor Trucks—Under Most Conditions a Two-motor Equipment is Sufficient for City Cars



More Pay-As-You-Enter Cars for Portland, Oregon — Longitudinal Seats Were Adopted on Account of Their Increased Capacity in Order to Meet the Heavy Rush Hour Service

suburban type of car much longer and heavier than those described in this article. The city lines are short and with one exception almost without grades. For this class of service a light weight car with a maximum capacity is imperative. The first cars of this type for Portland were mounted on Brill No. 27-G double motor trucks, but due to the favorable conditions it was decided that a two motor equipment would be sufficient for each car. Accordingly a motor was removed from each truck. This was not entirely satisfactory, as the heavy double-motor truck was unnecessary for a single motor equipment. Exhaustive tests showed that besides carrying this extra weight all the time only a little more than 65% of the weight of the car was available for adhesion, that is, rested on the driving wheels. To meet these conditions the Brill Company designed the 22-Special truck which was a much lighter truck and allowed a decrease of 500 lb. per car in the weight of the bolsters at the same time increasing the per-



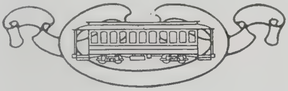
MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON—The Platform is Similar to that in Use by Most of the Lines Which Have Adopted the P-A-Y-E Cars as Standard

centage of the weight resting on the driving wheels to about 70%. This truck was tried out on the lines of this company and proved so satisfactory that it was immediately adopted as standard type of truck for city cars for that as well as the other Clark properties among which are the East St. Louis and Suburban; Alton, Granite and St. Louis Traction Co.; East St. Louis Ry. Co.; Rockford and Interurban Ry. Co; Springfield Ry. and Lt. Co.; Grand Rapids Ry. Co.; Saginaw-Bay City Ry. Co.; Columbus Ry. and Lt. Co.; Chattanooga Ry. and Lt. Co.; Lookout Mountain Ry. Co.; and the Lewiston, Augusta and Waterville St. Ry.

The side sills are each made up of two members, $2\frac{1}{2}$ by $7\frac{5}{8}$-in. and $1\frac{1}{8}$ by $7\frac{1}{8}$-in. yellow pine reinforced with a steel plate $15\frac{1}{2}$ by $\frac{3}{8}$-in. with $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{2}$-in. angle irons riveted to top and $4\frac{1}{2}$ by 3 by $\frac{3}{8}$-in. angle iron riveted to bottom to prevent buckling and of such proportions and attached in such a manner as to give the construction the general characteristics of a Z bar. The end sills are of $5\frac{1}{4}$ by 7-in. oak reinforced with a 6 by $\frac{1}{2}$-in. steel plate extending the whole length of the sill and bent at right angles at each end and bolted to the side sills. All the cross sills are of white oak supported and held in place by sockets formed by special castings of the best quality of malleable iron riveted to steel plate before it is attached to the wooden sill. At each cross sill a ¾-in. tie rod is used with cup washer on the outside of each side sill.

The general dimensions of the cars are as follows:

Length of body	31 ft. 6 in.	Platform to car floor	10¼ in.
Length over platforms	46 ft. 10 in.	Type of trucks	Brill 22 Special
Length of each platform	7 ft. 8 in.	Motors	GE-210 2-65 h. p.
Centers of side posts	2 ft. 8¾ in.	Wt. of car body less electrical equip. (approx.)	19,000 lb.
Width over sills	8 ft. 0 in.		
Width over posts	8 ft. 6 in.	Wt. of electrical equipment (approx.)	8,050 lb.
Extreme width	8 ft. 10 in.		
Track to sill	2 ft. 7½ in.	Wt. of air brake equipment (approx.)	1,500 lb.
Side sill over trolley boards	9 ft. 6⅜ in.	Wt. of trucks (approx.)	9,920 lb.
Floor to headlining	8 ft. 4 in.	Wt. of motors (approx.)	6,600 lb.
Track to step	1 ft. 3⅛ in.		
Step to platform	1 ft. 1 in.	Total approximate weight	45,070 lb.



ELECTRIFICATION OF STEAM RAILWAY SYSTEM IN NORTHERN ITALY

IN THE RIVIERA

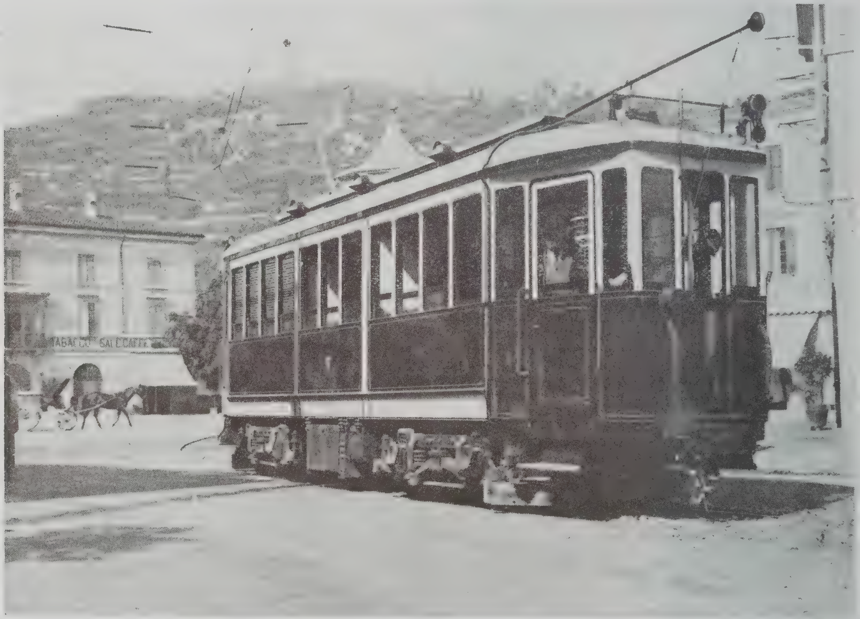
IN northern Italy, steam tramway lines were built some thirty years ago, by foreign companies (mostly Belgian and English), connecting the larger cities with the small towns, throughout the Alpine valleys and along the Riviera.

These lines are lightly equipped and follow the important Provincial or National roads, being subject to their irregularities and in some places have a gradient of 50 or 60%, though the average gradient is about 35%.

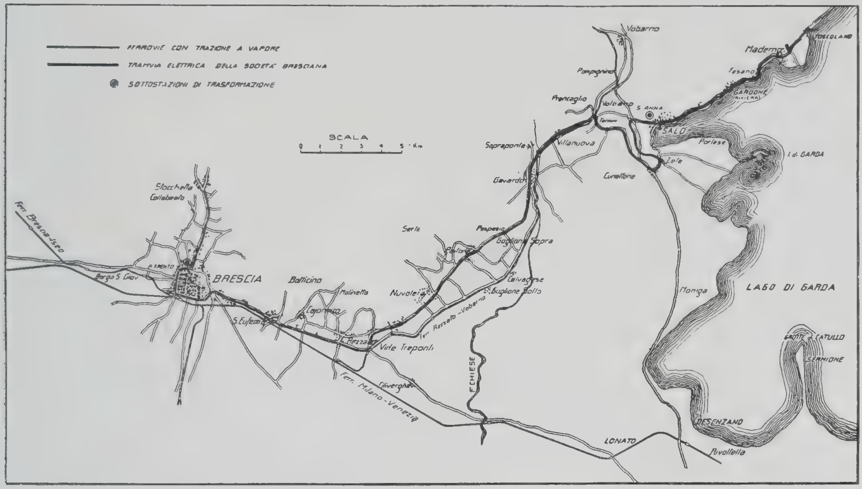
Concessions were formerly obtained from the owner of the Road, Commune or Province and the local communities contributed for such repairs and special construction as were necessary to the laying of the track, but these lines have proved such an important economic factor in the regions they traverse that the Government has taken upon itself the granting of concessions and provides an annual subsidy for a period of fifty years.

The track on such lines is generally light; Vignole rails of 18 to 23 kilos per meter are laid on oak ties 0.75 to 0.80m. apart, in ballast, the rails level with the ground. The gage is usually 1.445m. and on some western lines 1.10m. and the cost of laying varies from 15000 to 25000 lires per kilometer, the yearly maintenance being about 5 or 6% of the cost. The traction expense is about one-third and the fuel expense about one-sixth of the total cost of maintenance. Italy not being a coal producing country, the fuel constitutes a large item on the tramway budget and without the Government subsidies a steam line would be an unprofitable enterprise.

The problem of electrification of such lines has long been contem-



Electrification of Steam Railway System in Northern Italy—The Cars Have a Seating Capacity of 40 Passengers and are Arranged for Multiple Unit Control—They are Mounted on Brill No. 27-G Trucks



The System Is Composed of 29 Miles of Line Operated by the Societa-Electrica Bresciana

plated but delayed by technical and financial difficulties. The principal technical difficulties were: 1st, that the light track now in use was incapable of sustaining the wear and tear of high speed electric traction; 2nd, the difficulty of electric distribution on long lines radiating from one point. The principal financial difficulties were the great preliminary outlay of capital and the uncertainty of a rapid increase in receipts on an interurban line. If interurban traffic had the intensity and frequency of town traffic, the light rails would, of course, be inadequate, but on interurban lines the traffic may be estimated at 4, 5 or 6 trains per day. In electrifying the road and increasing this to 12 or 14 trains per day, there is a headway of one hour. This is quite different from city traffic with headways of 5 or 10 minutes. Furthermore, the average weight per axle of a steam tramway locomotive is 8 or 9 tons, whereas an electric car of double power, mounted on bogies will have a maximum weight per axle of 5 or 6 tons and hammers the track far less than a locomotive.

The electrification of an interurban road may be begun without change of track, providing the same is in good working condition and all that is necessary is a re-inforcement at the joints and curves. The practical utilization of high voltage on railway systems has solved one of the greatest difficulties in the electrification of these roads. With high tension currents, direct or alternating, a single power station will serve the whole system, reducing considerably the first cost of distribution and the working expenses. The overhead construction is a matter requiring careful study, in order to secure strength and safety at the lowest possible cost and reduce maintenance and repairs to a minimum. The American catenary system fills these requirements, combining the necessary strength and insulation. As to expenses: The working of a steam tramway in Italy costs from 1.20 to 1.50 lires per train-kilometer. After electrification, the passenger rates may be cut in half, the number of trains per day doubled and the total expense will not exceed one half of the above figures.

Electrification of Steam Railway System in Northern Italy—Provincial Road Near Tormini. The Overhead Construction is the American Catenary System

A recently electrified line in Northern Italy is that between the town of Brescia (east of Milan) and the Lake of Garda. This line, 29 miles in length, built and operated by the Societa-Electrica Bresciana, runs from Brescia to Virle along a splendid highway, then through a valley, with numerous factories and mills; over the Provincial road to Tormini and then along the coast, connecting a number of resorts of the Riviera to Toscolano. The line is fed from two end sub-stations, one in Brescia, the other in Salo.

The cars, seating forty passengers each, are arranged for multiple unit control. The Brill 27-G trucks, on which the motor cars are mounted, are equipped with G. E. Z. 50 H. P. motors and have a 1400mm. wheelbase, the distance between the truck centers being 4900mm. The total length of the car over the two closed, vestibuled platforms is 10.5 meters and 11.12 meters over the bumpers. The Company has eight of these cars, each drawing three 2 axle trailers, thus constituting a very light train of large capacity.

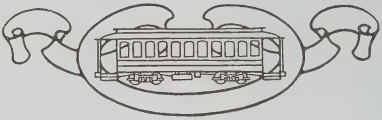
ELECTRIFICATION OF STEAM RAILWAY SYSTEM IN NORTHERN ITALY—Train on Private Right of Way Near Salo Showing Fill and Culvert Construction

For its interurban service between Brescia and the Riviera, the company was forced to adopt a narrow bodied car, reducing the outside cross dimensions to 2.20m. One motor car is in operation, the electrical equipment being the G. E. Z. 217 four motor series with multiple unit control. The car, which is of Italian make, draws two or three trailers, and each truck is equipped with two 600 v. 45 H. P. motors.

The suburban cars connect two different lines of about four miles each in length. These cars are 8100mm. over the platform ends; seat 20 passengers, with room for 20 more on each platform.

The power required for the railway is generated in several hydraulic plants, about 50 kilometers from Brescia and is transformed in 1200v. direct current in two sub-stations, one in Brescia, the other in Salo. A favorable circumstance to be noted is, that the sub-stations are located near the extremities of the lines and are fed by separate generating stations.

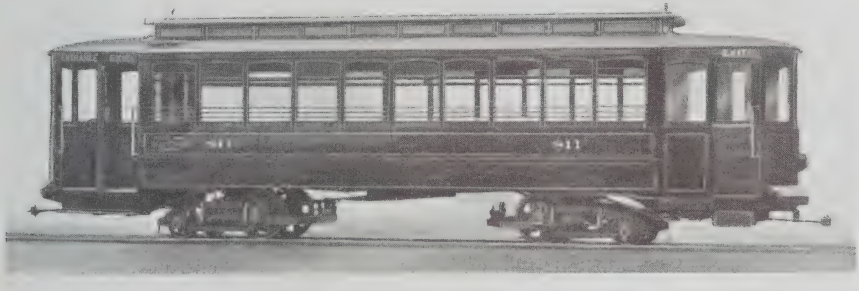
The results of the electrification of this road have far exceeded the hopes of those who engineered the enterprise. The construction of the line, trials of new rolling stock, instruction of men and the complete installation of the new electric service was accomplished without interrupting the old service in the least. This contributed largely to the financial success of the undertaking and the traffic is steadily increasing.



PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.

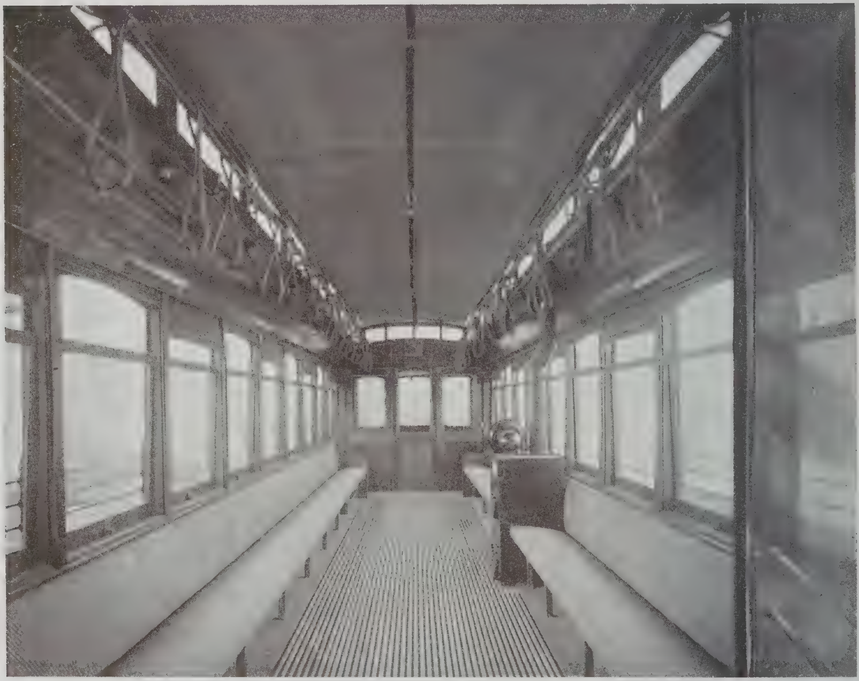
CHANNEL STEEL PLATFORM KNEE

DURING the past month the Rockford & Interurban Railway Co. placed in operation on its Rockford lines an initial equipment of 28-ft. P-A-Y-E cars mounted on single-motor trucks. The P-A-Y-E arrangement is of the usual type for double-end cars and includes single swing doors at the entrance and rear exit and sliding door at the front exit. The platforms are 6 ft. 6 in. long and supported by the new type of channel steel knee which was designed at the Kuhlman plant where the cars were built and which is coming into standard use at the several Brill plants. This knee has been subjected to thorough tests and proved capable of sustaining three times the weight it would be subjected to by a crowded platform. Aside from its strength it has the advantage of lighter weight and better appearance over the plated timber knee. This knee was patented some time ago and has been in use for a considerable period, but was introduced to the railway field generally at the October Atlantic City Convention where it attracted much attention

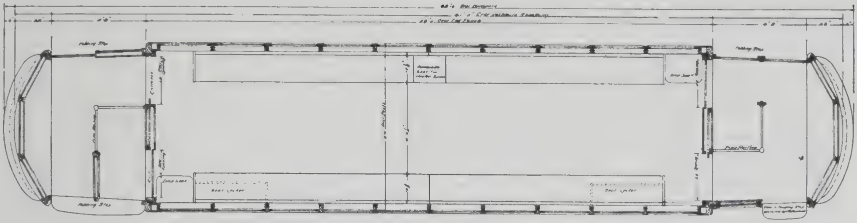


PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Cars are for Use on the Company's City System in Rockford. They Are Mounted on Brill No. 39-E Type of Single-motor Trucks and favorable comment. It is another indication of the approaching use of steel in car framing to obtain a lighter and stronger construction and being made of structural material has advantages over the special pressed shapes in being lighter, stronger and costing less. It is hardly necessary to point out the importance of this improved member in association with long platforms and the lighter construction demanded at present.

The photographs show the general details of the cars and make an extended description unnecessary. The upper window sashes are stationary and the lower drop into covered pockets. The diagram shows the seating arrangement and indicates that the heater at the center is removable and may be replaced by a seat. The heater is the Peter Smith Company's forced ventilation in which the fresh air is taken from beneath the car through a perforated plate under the



PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Forced Draft Ventilating Heater Is Removed and a Section of Seat Substituted during the Summer



PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Floor-plan Shows the Single Folding Seats at Opposite Corners of the Car and the Location of the Heater

heater, is then drawn up into the body of the heater and forced down into an air tight compartment surrounding a hot cylinder and then into ducts leading along the side of the car below the seats.

Along with these cars was a shipment of five 22-ft. single-truck cars mounted on Brill No. 21-E type of single-trucks. The platforms are vestibuled and arranged with entrance at one side only. The cars are for double end operation and will be used on the city lines in Rockford.

The dimensions of the larger cars are as follows:

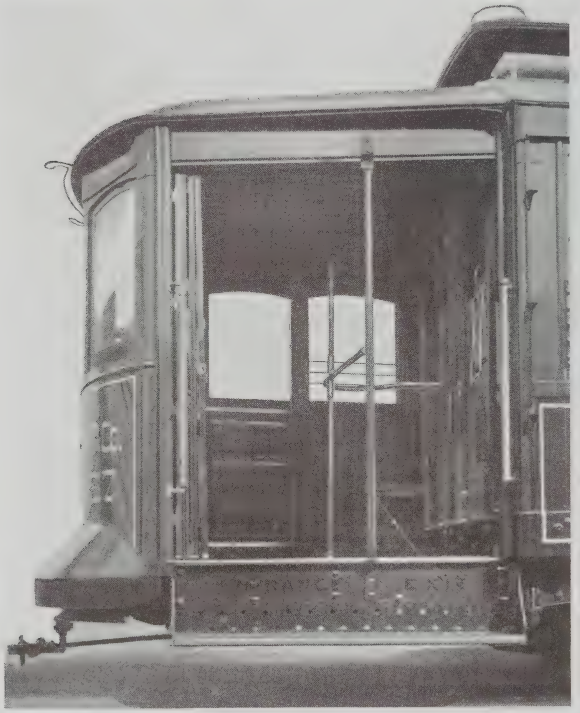
Length of body	28 in. 0 in.
Length over platform . .	41 ft. 0 in.
Length of platforms . . .	6 ft. 6 in.
Centers of side posts . .	2 ft. 8 in.
Width over sills	8 ft. 0½ in.
Width over posts	8 ft. 4 in.
Extreme width	8 ft. 7 in.
From track to side sills .	2 ft. 8 in.
From side sills over trolley boards	9 ft. 5¾ in.
From floor to headlining .	8 ft. 5⅝ in.
From track to step tread .	15⅜ in.
From step tread to platform	14½ in.
From platform to car floor	9 in.

Seating capacity	34
Type of trucks	Brill 39-E
Type of motors . . G. E. 57.	2-50 h. p.
Weight of body less electric equipment	18,400 lbs.
Weight of electrical equipment (approx.)	1,300 lbs.
Weight of air brake equipment (approx.)	1,600 lbs.
Weight of trucks	9,300 lbs.
Weight of motors (3300 lb. each)	6,600 lbs.
Total weight	37,200 lbs.

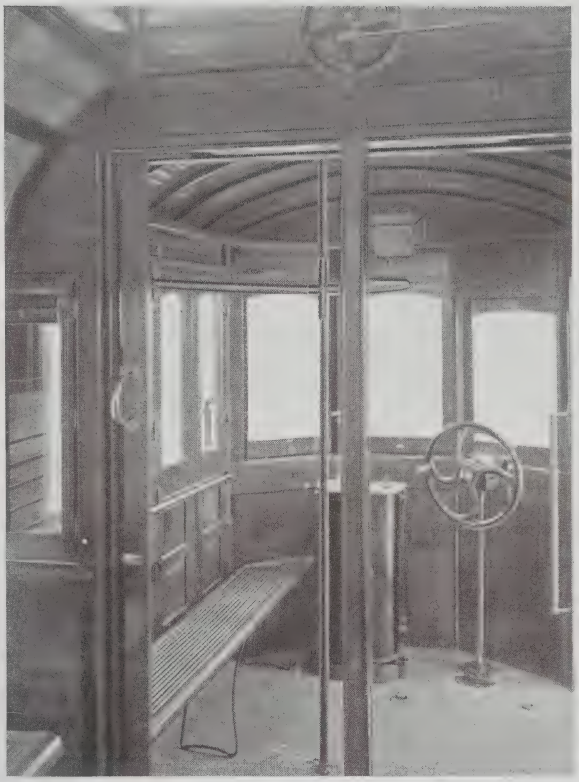
SEMI-CONVERTIBLE CARS FOR SAN ANTONIO

SAN ANTONIO TRACTION COMPANY

THE seating arrangement of the latest lot of cars delivered to the San Antonio Traction Company by the American Car Company is particularly interesting. In the car body the seats are the usual transverse arrangement with corner seats occupying the space of a single window. The corner seats are permitted by the fact that the doors slide into recesses at the sides and a division post is used at the center. This arrangement of the bulkhead doors provides room for platform seats. One, accommodating four passengers, folds against the body at the entrance side and a single folding seat is located at the opposite side. Thus the front platform can be used, if desired, as a smoking compartment. The window posts are spaced 2 ft. 6 in. a part which is two inches shorter than usual but is now generally conceded to allow a seating plan with a satisfactory



Semi-Convertible Cars for San Antonio—The Pay-As-You-Enter Rail is Curved to make Room for the Conductor Without Obstructing the Rear Exit—The Folding Single Seat and the Folding Longitudinal Seat Accommodate 5 Passengers on the Front Platform

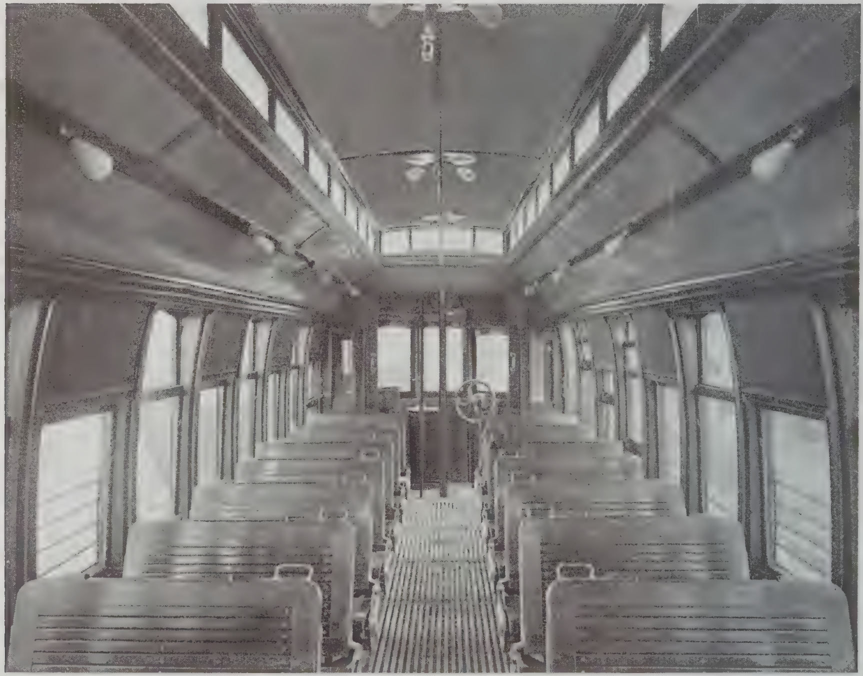


Semi-Convertible Cars for San Antonio—The Seat Against the Single Folding Door Folds up Against the Bulkhead when not in Use—The Pay-As-You-Enter Rail Slides up out of the Way of Passengers

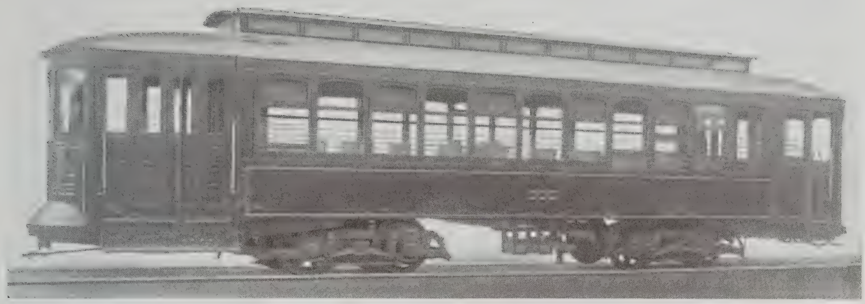
width between the seats. This gives the same seating accommodation in a car body 28 ft. 10 in. long as in a car 30 ft. 8 in. long with window posts spaced 2 ft. 8 in. apart. The seating capacity of the car body is 44 and the platform 5, making a total of 49. A four-leaf folding door hinged against the vestibule corner posts closes the entrance and a single sliding door closes the front exit. The steps operate in conjunction with the doors. The railing which divides the passage ways on the platforms is brought to the division post between the doors and is curved in a manner to allow the conductor to stand out of the way of passengers leaving by the rear exit. This railing is brought around close to the folding doors at the side and is arranged to slide up on vertical pipes and securely locked overhead and out of the way of passengers.

Semi-convertible cars have long been used on the San Antonio lines, a description of a shipment being given in the June, 1907, issue of Brill Magazine, together with a description and photographs of the railway system. During the past year most of the P-A-Y-E cars built for various parts of the country have been of the semi-convertible type (each of the four P-A-Y-E cars described in this issue of BRILL MAGAZINE are of the semi-convertible type). Whether for a mild climate such as that of San Antonio or for the climate of the northern cities, the semi-convertible feature is in general demand and is coming into standard use in the larger cities of the country. In San Antonio for the larger part of the year the windows are raised entirely into the roof pockets, but are always available for protection from wind and rain; therefore, passengers have what is practically an open car in the summer and in the winter the interior is bright and attractive. In connection with this window system, the standard framing construction includes a 15 by ⅜-in. steel plate on the inside of the sills which eliminates the necessity of inside and under trusses, and, being secured to posts, adds to their support.

The Brill No. 27-G truck is the standard truck of the system and



SEMI-CONVERTIBLE CARS FOR SAN ANTONIO—The Window Posts are 2 ft. 6 in. apart Giving the Same Seating Capacity in a Car 28 ft. 10 in. long as in a 30 ft. 10 in. Car with Window Posts 2 ft. 8 in. Apart



Semi-Convertible Cars for San Antonio—During the Larger Part of the Year the Windows are Raised into the Roof Pockets Giving a Practically Open Car—The Car Body is Mounted on Brill No. 27-G1 Trucks

has a wheel base of 4 ft. 6 in.; the track gage is 4 ft. The lines have a trackage of 65 miles and 160 cars are in operation.

The general dimensions of the cars are:

Length of body	28 ft. 10 in.
Length over platforms	42 ft. 10 in.
Length of platforms	7 ft. 0 in.
Centers of side posts	30 in.
Width over posts at belt	8 ft. 0 in.
Extreme width	8 ft. 4 in.
From track to side sills	32$\frac{1}{2}$ in.
From sills over trolley boards	9 ft. 6 in.
From floor to headlining	8 ft. 4$\frac{1}{8}$ in.
From track to step tread	17$\frac{7}{16}$ in.
From tread to platform	14 in.
From platform to car floor	8 in.

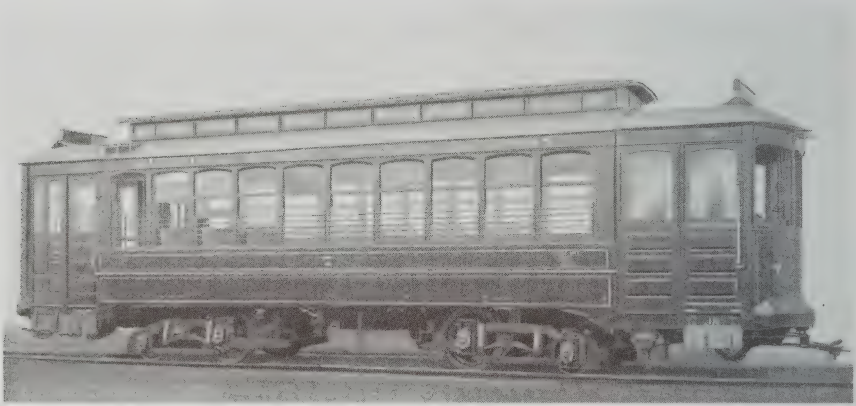
Seating capacity	44
Type of trucks	Brill No. 27-G-1
Type of motors	G. E. 54—4-25 h. p.
Weight of body less electric equipment (approx.)	19,000 lb.
Weight of electrical equipment (approx.)	8,499 lb.
Weight of air brake equipment (approx.)	1,500 lb.
Weight of trucks, less wheels	3,420 lb.
Weight of motors, each 1831 lb.	7,324 lb.
Total approximate weight	39,743 lb.

EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY

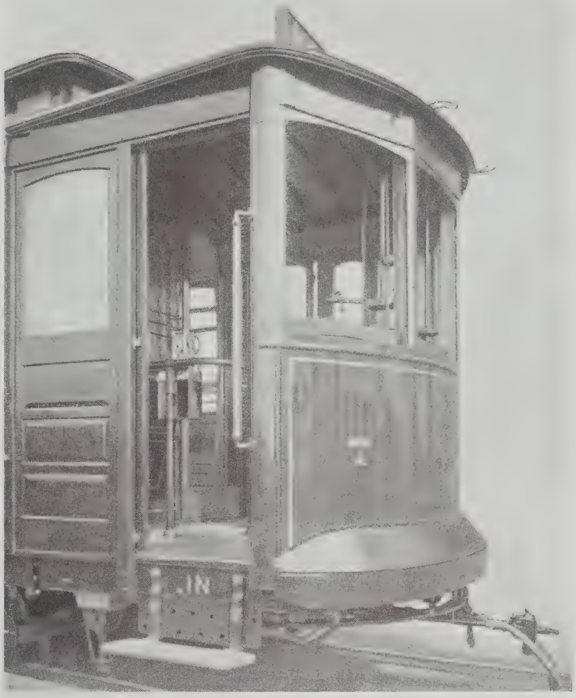
ONE-MAN PREPAYMENT

THE Missoula Street Railway Company, Missoula, Mont., recently received a second shipment of cars from the American Car Company consisting of four semi-convertible Pay-As-You-Enter cars and one construction car. The first delivery was of three cars duplicates of those described in this article. These eight cars, together with two 14-seat open trail cars and one Brill short-broom sweeper bought from The J. G. Brill Company form the initial equipment of this company.

Missoula is a city of about 10,000 inhabitants located near the western boundry of Montana and is one of the few smaller cities to install new equipment from the start. On account of the comparatively light travel it was deemed best to dispense with the conductor, so each vestibule is arranged to be locked or thrown open for exit and entrance. The double end arrangement was necessary as the lines are built to operate the cars in either direction. The rear vestibule is always locked and on the front vestibule the sliding door to the right



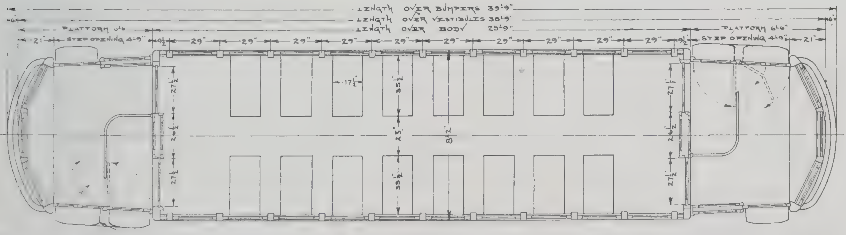
EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY—The Rear Vestibule is Closed and the Entrance and Exit are on Opposite Sides of the Front Platform—The Cars Are Mounted on Brill No. 39-E Single-Motor Trucks



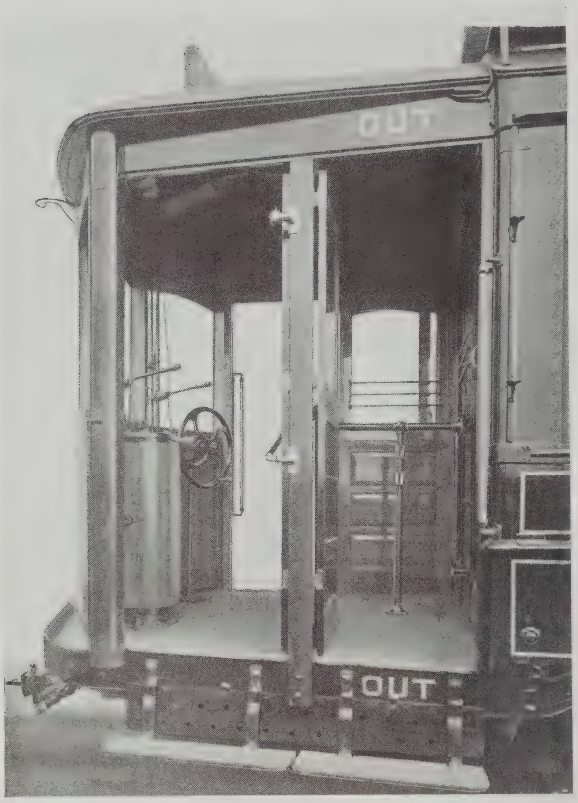
Equipment for the Missoula Street Railway Company—The Entrance is at the Motorman's Right—Brill Fare Boxes are Used in Connection with the One-man Prepayment System

of the motorman is the entrance and the folding door next to the body of the car on the left of the motorman is the exit. Both of these doors are controlled with levers by the motorman. The front folding door to the left is locked. Directly in front of the bulkhead and attached to the iron rail which divides the entrance and exit is placed a Brill No. 4-A fare box. With this arrangement the motorman is able to do his own work as well as that of the conductor without leaving his station at the front of the car. The steps are all folding and are operated in conjunction with the doors, being folded up when the doors are closed and dropped when the doors are opened.

The side sills are 4 by 7¾-in. yellow pine plated with ⅜ by 12-in.



Equipment for the Missoula Street Railway Company—The Floor Plan Shows the Step Arrangement—The Three Cars in the First Order had a Single Step at the Left of the Motorman and the Last Four had Double Folding Steps



Equipment for the Missoula Street Railway Company—The Exit is at the Motorman's Left—The Doors Are Operated by Levers Directly in Front of the Motorman

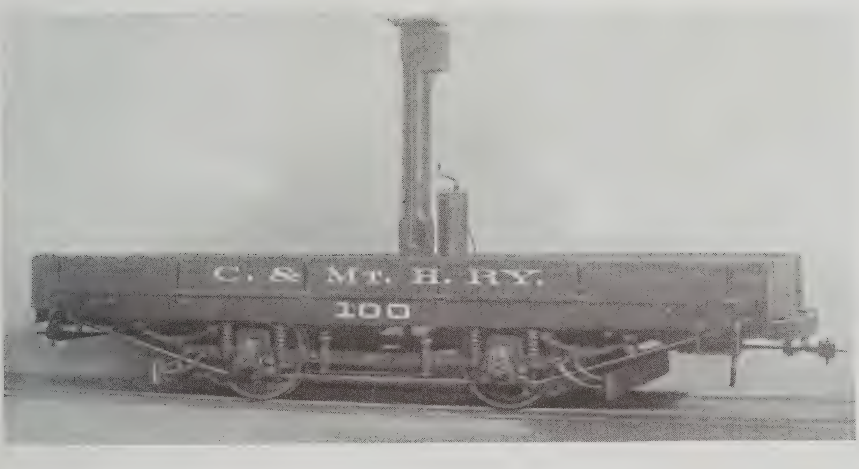
steel on the inside. The car is equipped with Brill patent angle iron buffers and Dumpit sanders. The exterior is painted a rich dark green and is decorated with a gold stripe. The interior of the car is ash and the ceiling 3-ply birch veneer. The seats are Brill Winner type. The window frames are ash to match the interior and stained mahogany on the exterior. The sashes are arranged to push up into ceiling pockets, the upper sash working automatically with the lower. The cars are mounted on Brill No. 39-E single-motor trucks and as can be seen from the engraving each car is equipped with air brake hose for trailer attachment. The dimensions are as follows:

Length of body	25 ft. 9 in.	From sills over trolley boards	9 ft. $7\frac{3}{8}$ in.
Length over platforms	38 ft. 9 in.	From floor to headlining	8 ft. $4\frac{3}{8}$ in.
Length of platforms	6 ft. 6 in.	From track to step	1 ft. $4\frac{3}{8}$ in.
Centers of side posts	2 ft. 8 in.	From step to platform	1 ft. 2 in.
Width over sills	7 ft. $11\frac{1}{2}$ in.	From platform to car floor	$9\frac{5}{8}$ in.
Width over posts	8 ft. 2 in.	Seating capacity	32
Extreme width	9 ft. 2 in.	Type of truck	Brill No. 39-E
From track to sills	2 ft. $8\frac{1}{4}$ in.	Motors	G. E.-219 2-50 h. p.

CONSTRUCTION CAR FOR THE CARLISLE & MT. HOLLY RAILWAY CO.

FOR small railway systems the car shown has proved to be a useful part of the rolling stock as it is suitable for handling construction material and is also useful for the transportation of coal and cinders. In other words, it is a general utility car substantially built and well suited in every particular to the variety of purposes which it is intended to fulfill.

The hinged sides and ends are 12 in. high and 1¾ in. thick. Brill angle iron bumpers, radiating draw bars, gongs and sand boxes are used and the body is mounted on Brill 21-E truck with 7-ft. 6-in. wheel base, 33-in wheels arranged for 5-ft. 2½-in. track gage. The length of the body over the bumpers is 23 ft. 8 in. and the width over the sides is 6 ft. 6 in.



Construction Car for the Carlisle & Mt. Holly Railway Co.—A General Utility Car—The Sides and Ends Are Hinged to Drop Down—Car Is Mounted on Brill No 21-E Truck

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BRILL MAGAZINE

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In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.

* * *

BRILL MAGAZINE completes its fourth year with this issue. Commencing with a mailing list of twenty-three hundred names, over one thousand have been added each year and at present the circulation totals sixty-five hundred copies monthly. Forty-five hundred copies are distributed in the United States and Canada and two thousand are sent abroad. The circulation has been largely built up from requests to be placed on the list, and our salesmen and agents have at frequent intervals sent names, singly and in groups. Every name is alphabetically and geographically indexed and a systematic revision is carried on continually. Each year a letter is sent to every name on the list, a return-card being enclosed to confirm the address and to make sure of the magazine reaching the person addressed. Binders are furnished each year to those who request them—eight hundred were sent out the first of this year. In correspondence with customers Brill Magazine is continually used as a reference medium for types of equipment, dimensions and other data and it has proved in numerous ways to be the most direct, adequate and economical means which we can employ of keeping in touch with the entire field at home and abroad. By starting with a small circulation and allowing its growth in the main to depend on its merits; by keeping in touch with every name on the mailing list at regular intervals; by sending volume binders on request; by its use to customers as a reference medium; and by correspondence elicited from new sources, we are able to correctly estimate the value of the publication.

* * *

IT may interest our readers at home and in English-speaking countries to know how Brill Magazine is made acceptable to railway officials in countries where English is not understood. Commencing with the first issue of 1908, a four page folder containing a digest of each article and the complete inscription relating to each illustration, in either French or Spanish, has accompanied the copies sent to the countries where those languages are spoken or read.

WHEN one considers how serious a problem is that of traffic maintenance on city railway systems during and after heavy snow storms, it seems remarkable that manufacturers and technical writers have accorded the subject so comparatively little attention. That heavy snow storms are an infrequent occurrence even in the snow belt, may account in some measure for this. The modern sweeper is a well developed and efficient machine but it has its limitations and in deep snow and drifts must have the aid of heavier equipment. It must be admitted that the snow plow is somewhat primitive, *i.e.,* primitive in principle. With the exception of some unsuccessful experiments with various devices for melting the snow, progress has been merely along the lines of the basic ideas which postulated the "bucking" method of snow fighting as the only method, thus restricting development and to some extent precluding originality in inventive effort. There is no doubt that the deplorable traffic conditions attendant upon heavy snow falls could be greatly relieved, if not entirely prevented by the immediate and continuous employment of a sufficient number of sweepers or sweepers and plows, but as this would require so many, such provisions for an occasional condition is out of the question. Aside from the first cost, the railway company would be compelled to build extra barns for their accommodation. In the future perhaps, inventive genius will produce a more adequate device than the snow plow, but for the present an increased equipment and the best possible distribution thereof is the only visible solution of the problem, and an imperfect solution at that.

* * *

IN the November issue of Brill Magazine we devoted some space to the subject of standardization of equipment and the generally beneficial results which might follow upon such a procedure. Though we spoke optimistically and hopefully, it was not without a full realization of the numerous difficulties in the way of the consummation of this apparently ideal and scientific condition. The designer and builder of rolling stock for electric railways faces greater problems than fall to the lot of technicians and mechanical engineers in most industries because of the great variety of types of equipment and the continually changing conditions. The electric railway industry is still young and it naturally follows that railway operators and the designers of rolling stock have not learned everything there is to be known. This mutual lack of knowledge, or imperfect comprehension, tends not only to retard development but to deflect it from the proper channel. The operator is apt to mistake conditions that are temporary for those that will be permanent and the designer and builder

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faces the problem of satisfying individual demands and drawing from them correct conclusions as to those conditions which will eventually become general and permanent. This he must do in order to adhere to the proper highway of logical development. It is essential to all real progress that there be a perfect understanding of the fundamental principles involved. The changing conditions in the electric railway industry preclude to some extent this necessary understanding. In other words—the economic nature of the proposition has not been completely realized nor can be until the conditions that are general and permanent and their relation to the principles of construction and operation have been established.

IN the November issue of Brill Magazine we spoke of the higher standard of commercial ethics that is being generally adopted, and of the new era that has dawned upon the world of business. To follow the subject a little further—The keenness of competition and the ever increasing intensity of the struggle for existence and survival in the industrial world causes continual upheavals and readjustments of conditions. The individual must be constantly producing something better, something a little above that of his predecessor or contemporary. To accomplish this, he must put more of himself into his field of endeavour for only by so doing can he hope to get more out of it. In earlier times when the commercial arena was less crowded and men were less enlightened and developed, the old conception of the term "business" was born. Business, in the then restricted sense of the term, meant shrewdness, hard, cold practicality and close calculation which often defeated its purpose. As time went on, business conditions were ameliorated but the original conception of the meaning of the term remained. The business man laid aside his higher intellectual, moral and social nature and, stripped of his most valuable and finest possessions, entered the mercantile field—a fraction of a man. Because this fraction was all business and nothing but business he imagined that he had reached the acme of commercialism. But the day has passed when a man may give to his work but a fraction of himself. The modern business man knows that he must give all of his many sided nature, all his versatility, all of himself; for his commercial, social, philosophical and imaginative nature combined is essential to effect the highest development of his creative and executive faculties.